

What is claimed is:

1. A system comprising:

a rectifier having an input for connection to an ac source and an output; and

an inductance-capacitance filter connected to said output of said rectifier where said inductance comprises one or more non-linear inductors.

2. The system of claim 1 wherein each of said one or more non-linear inductors has an inductance value at lower operating current that is higher than the inductor inductance value at a higher operating current.

3. A system comprising:

a rectifier having an input for connection to an ac source and an output;

one or more non-linear inductors connected between said input of said rectifier and said ac source; and

a capacitor connected across said output of said rectifier.

4. The system of claim 3 wherein each of said one or more non-linear inductors has an inductance value at lower operating current that is higher than the inductor inductance value at a higher operating current.

5. A method for making a non-linear inductor from magnetic material comprising:

providing an air gap in said magnetic material that has two or more widths; and

adjusting either each of said two or more air gap widths or the width of said magnetic material adjacent to said air gap to produce a desired non-linear inductance characteristic for said inductor.

6. The method of claim 5 wherein said two or more widths in said air gap are provided by one or more steps in said magnetic material.

7. The method of claim 5 wherein said desired non-linear inductance characteristic for said inductor is produced by adjusting only each of said two or more air

gap widths.

8. The method of claim 5 wherein said desired non-linear inductance characteristic for said inductor is produced by adjusting only the width of said magnetic material adjacent to said air gap.

9. A method for making a non-linear inductor from laminations of magnetic material having different widths comprising:

stacking said laminations to produce an air gap with two or more widths; and

adjusting the width of said air gap and the number of said laminations to produce a desired non-linear inductance characteristic for said inductor.

10. A method for making a non-linear inductor from laminations of magnetic material having different widths comprising:

stacking at least a predetermined number of said laminations having one of said different widths and a predetermined number of said laminations having another of said different widths to produce an air gap with two or more widths; and

adjusting the arrangement of said predetermined number of said laminations having one of said different widths and said predetermined number of said laminations having said another of said different widths in said stack to produce a desired non-linear inductance characteristic for said inductor.

11. A non-linear inductor comprising:

a first stack of laminations each having the same predetermined shape and at least one leg and at least one step at the end of said at least one leg; and

a second stack of laminations each having the same predetermined shape adjacent said first stack of laminations to form a flow path for magnetic flux, said at least one step at said at least one leg end and said second stack of laminations creating an air gap that has

two widths between said at least one leg and said second stack of laminations to produce a desired non-linear inductance characteristic for said non-linear inductor.

12. The non-linear inductor of claim 11 wherein said first stack of laminations each have an E shape each having a center leg and end legs and said at least one leg having a step is selected from said center leg or at least one of said end legs.

13. A non-linear inductor comprising:

a first stack of laminations each having the same predetermined shape and at least one leg, a first predetermined number of said laminations in said first stack having a first predetermined length for said one leg and a second predetermined number of said laminations in said first stack having a second predetermined length for said one leg; and

a second stack of laminations each having the same predetermined shape adjacent said first stack of laminations to form a flow path for magnetic flux, said one leg and second stack of laminations creating an air gap that has at least two widths between said at least one leg and said second stack of laminations to produce a desired non-linear inductance characteristic for said non-linear inductor.

14. The non-linear inductor of claim 13 wherein said first predetermined number and said second predetermined number of said laminations in said first stack are selected in a ratio to each other to produce a desired inductance characteristic for said non-linear inductor.

15. The non-linear inductor of claim 13 wherein said first predetermined number and said second predetermined number of said laminations in said first are arranged in an order with respect to each other to produce a desired inductance characteristic for said non-linear inductor.

16. The non-linear inductor of claim 13 wherein said first stack of laminations each have an E shape each having a center leg and end legs and said at least one leg in said first predetermined number of said laminations having a first predetermined length is selected from said center leg or at least one of said end legs and said at least one leg in said second predetermined number of said laminations having a second predetermined length is selected from said center leg or at least one of said end legs.

17. A non-linear inductor comprising:

a magnetic material tape wound toroidal core; and
an air gap in said core having at least two widths.

18. The non-linear inductor of claim 17 wherein said core is cut in an axial direction to produce said air gap, said air gap having a first width adjacent the edges of said toroidal core and a second width between said first widths.

19. The non-linear inductor of claim 18 wherein said first width is greater than said second width.

20. The non-linear inductor of claim 17 wherein said core is cut in a radial direction to produce said air gap, said air gap having a first width adjacent the outer edge of said toroidal core and a second width adjacent the inner edge of said toroidal core.

21. The non-linear inductor of claim 17 wherein said first width is greater than said second width.